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AIR TEMPERATURES FROM TAYLOR GLACIER DRY VALLEY, VICTORIA LAND, 1961

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One of the more interesting problems of Antarctic geology concerns the origin of the large dry valleys in Victoria Land. Geothermal heating and localized climatic conditions have been advanced to explain these phenomena but no one explanation satisfactory to all has been advanced. Doubtless several interrelated physical factors control the local climatic conditions in these valleys.

Little meteorological data of any kind has been available. This paper presents data collected during the summer of 1961. From late October until mid-December, 1961, two maximum–minimum thermometers were set up on the ice of Lake Bonney in the course of limnological and geochemical studies of the lake. Each thermometer was housed in an unpainted box, 18 in. by 12 in. by 12 in. with an open front covered with coarse burlap. One box, erected on a bamboo pole, was set 4 ft. above the ice surface; the other box was placed on the ice with the thermometer positioned about 2 in. above the ice. Unfortunately, daily readings were not possible, as these field stations were visited only periodically.

The highest temperature read on the upper thermometer was 23·9° C., recorded sometime between 4 and 16 December; whereas 2 in. above the ice surface, the highest temperature was 8·3° C. (Note that from 28 November 1961, the maximal part of the lower thermometer did not read properly.) Snow in excess of 1·90 cm. accumulation fell three times in Taylor Glacier Dry Valley and Wright Valley during field operations. There was little wind during snowfall and each time the snow quickly melted. This information supports the hypothesis that the valleys, at least in part, are kept dry by local climatic conditions.

Air temperature on ice surface of Lake Bonney

Date (1961)	Thermometer height: 4 ft. above ice surface — Max. °C.	4 ft. above ice surface — Min. °C.	2 in. above ice surface — Max. °C.	2 in. above ice surface — Min. °C.	Time read
31 October	3·3	−6·1	−6·1	−8·9	18.30
1 November	3·9	−15·3	4·4	−10·6	15.30
2 November	2·2	−7·8	8·3	−6·1	16.30
3 November	5·6	−16·1	5·6	−12·2	16.30
4 November	4·4	−18·3	0	−13·3	16.55
5 November	1·7	−16·1	−6·1	−11·7	18.05
6 November	3·3	−16·1	−6·1	−17·8	19.30
7 November	2·2	−17·2	−6·7	−13·3	20.00
8 November	3·9	−15·0	−3·3	−16·1	18.30
9 November	3·9	−15·0	−2·8	−5·6	19.30
10 November	2·2	−13·9	−2·2	−15·6	17.30
28 November	18·3	−14·4	—	−11·1	17.30
29 November	7·8	−7·8	—	−3·3	18.00
30 November	1·7	−5·0	—	0	18.30
1 December	3·9	−5·0	—	−2·2	18.30
2 December	16·7	−6·1	—	−1·7	20.30
3 December	−2·8	−6·1	—	−0·6	22.30
4 December	1·7	−7·2	—	−7·2	22.30
16 December	23·9	−6·7	—	−7·2	14.00
18 December	20·0	−3·3	—	−5·6	10.00

The rock types and geology of the area[1] undoubtedly have some bearing on these local temperatures; we have measured rock temperatures as high as 25° C. in this area. In the eastern Horlicks Mountains, where air temperatures seldom exceed −12·2° C., rock temperatures of 27·8° C. have been recorded.[2]

A greater warming effect, however, is probably caused by solar radiation reflected from the floor and steep rock walls of the valley. Considerable solar heating is possible through the summer months with the normal 24 hours of daylight. When we consider that air temperatures in January and February are probably higher than those reported, it is reasonable to assume that rock and air temperatures in excess of those recorded in Taylor Glacier Dry Valley occur.

References

[1] Angino, E. E., Turner, M. D. and Zeller, E. J. Reconnaissance geology of lower Taylor Valley, Victoria Land, Antarctica. *Bulletin of the Geological Society of America* (in press).

[2] Anonymous. Geological work in Eastern Horlicks. *Bulletin of the United States Antarctics Projects Officer*, Vol. 3, No. 6, 1962, p. 21.